

Prevention of eyelid malposition by three-step supporting technique in the transcutaneous lower blepharoplasty

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Abstract

Background: To investigate the effectiveness of the three-step supporting technique for prevention of eyelid malposition in the transcutaneous lower blepharoplasty.

Methods: It was a chart review of more than 10-year experiences of our method. From 2006 to 2017, a total of 697 patients underwent the three-step supporting technique in the transcutaneous lower blepharoplasty. The three steps included septum tightening, orbicularis canthopexy, and muscle plication. The assessment of outcome was made at 6 months. The results were assessed by evaluating pre- and postoperative appearance with Garcia-McCollough scale for lower eyelid overall appearance evaluation. The complication of eyelid malposition was evaluated in accordance with the grading system for post blepharoplasty eyelid malposition.

Results: Among the 697 patients, 285 patients underwent fat excision and 412 received fat repositioning for correction of the trough deformity. The follow-up ranged from 6 to 36 months: 94.2% of the patients had improvement, 4.4% no improvement, and 1.4% poor results; 95.1% (n = 663) had almost normal position, 3.2% (n = 22) scleral show, only 1.7% (n = 12) mild eversion, no patient frank eversion. All the 12 patients with slight malposition recovered through conservative treatment.

Conclusion: Three-step supporting technique is safe and effective for lower blepharoplasty with minimal chance of eyelid malposition.

Keywords: Lower blepharoplasty; Prevention of eyelid malposition; Support

1. INTRODUCTION

Lower-eyelid bag is a common finding that worsens with aging. The lower blepharoplasty is currently one of the most commonly performed aesthetic procedures.^{1,2} The techniques have evolved in order to prevent eyelid malposition in the transcutaneous lower blepharoplasty.^{3,4} We have more than 10-year experiences in the technique; therefore, we evaluate our three-step supporting technique for prevention of eyelid malposition in the transcutaneous lower blepharoplasty.

2. METHODS

2.1. Materials and patients

This was a retrospective study. The procedures were conformed to the ethical guidelines of the Declaration of Helsinki. The written informed consent was obtained from all the patients. The criteria for lower blepharoplasty included fat prolapse, laxity,

wrinkles, with/without tear trough deformity. We excluded patients with only fat prolapse because they were indicated for the transconjunctival lower blepharoplasty and those who had lower-eyelid surgery previously.

From 2006 to 2017, all the patients who were indicated for the transcutaneous lower blepharoplasty accepted the three-step supporting technique under local anesthesia. The procedures were performed by the designated surgeon (Dr. Xiao-gen Hu). The patients were asked to return at 1 week, 6 months, and afterward, they could also return for consultation if necessary. The final assessment was made at 6 months. They were asked to rate the improvement in accordance with the Garcia-McCollough Scale (GMS).⁵ The improvement was described as significant, moderate, minimal, no improvement, and poor result in eyelid contour according to the GMS. The significant improvement was defined as disappearance of eyebag without complications; moderate improvement as reduction of eyebag without complications; minimal improvement as limited reduction of eyebag with minor complications; no improvement as remaining eyebag with minor complications; poor result as remaining eyebag with serious complications including obvious scar and frank eversion. The complication of malposition was evaluated in accordance with the Grading System for Postblepharoplasty Eyelid Malposition which the lower-eyelid position was classified into normal, lateral rounding, scleral show, mild eversion, and frank eversion.⁶ Normal was defined as lower lid approximately 1 mm above the inferior limbus of cornea; lateral rounding as lid margin below the limbus with a rounded margin laterally; scleral show as central showing of limbus; mild eversion as tear pooling

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in inferior cul-de-sac; frank eversion as exposure of palpebral conjunctiva.

2.2. Preoperative evaluation and marking

Before surgery, the amount and distribution of fat compartments, the tear trough deformity, the tension of the orbicularis oculi muscle, and the wrinkles were evaluated and recorded. The fat compartments included the temporal, the central, and the nasal parts. The tear trough was classified as mild, moderate, or severe in accordance with severity.⁷ Lid laxity may be evaluated with the distraction tests. The distraction test was performed by pulling the lid away from the globe and measuring the distance to which the lid was pliable. Greater than 6 mm of anterior distraction from the globe indicated significant lid laxity. The wrinkles were evaluated by their length and number on the lower eyelid. Both the length and the number of the wrinkles were measured before and after operation.

The prominence of the fat pads and the edge of tear trough were marked on the skin for reference during surgery. The subcilia incision line was marked medially from the punctum and it extended along the limbus palpebralis to the lateral canthus, then angled down and continued laterally for a few millimeters.

2.3. Surgical procedures

Once the patient was prepped and draped, local anesthetic consisting of 1% lidocaine with 1:200,000 of epinephrine was injected into the subcutaneous plane and the plane behind the orbicularis oculi muscle. The lateral canthal area was also infiltrated by the same anesthetic. A total of 3 to 4 mL anesthetic was used for each lower eyelid.

A subcilia skin incision was made along the marked line and extended laterally beyond the lateral canthus, but not extending over the bony orbital margin. A subcutaneous dissection was first performed. The extent of dissection was 5 mm inferior to the cilia. The pretarsal orbicularis oculi muscle was kept intact. Then the orbicularis oculi muscles were incised, converting to an upper skin flap and lower bi-laminar flap. The preseptal dissection was proceeded downward to the level of the orbital rim. The bi-laminar flap was retracted, and the orbital fats were exposed.

2.4. Step one: septum tightening

The eyeball was gently pressed with the forefinger, enabling the excess orbital fat to protrude, then the septum along the arcus marginalis was incised to expose the orbital fat. The orbital fat was either repositioned or removed accordingly. For the patients without tear trough deformity, the excess fat of the medial, central, and lateral compartments was partially excised conservatively. The septum was tightened and anchored to the periosteum below the arcus marginalis in a fan-like manner with absorbable 5-0 Vicryl sutures (Ethicon, Inc. Somerville, NJ, USA) (Fig. 1A). The tightened septum created a firm undersurface for the bilaminar flap to rest upon. In the patients with tear trough deformity, fat repositioning was done. Blunt dissection was carried out in the supraperiosteal plane below the orbital rim to create a space for fat accommodation. Once the cavity was created, the fat flap was transposed over the orbital rim (Fig. 1B). The orbital septum was incised inferiorly. The orbital fat was accessed through small incisions in the septum. If excess fat was present, partial resection was performed. The septum was released from the arcus marginalis anterior to the orbital fat. Fat pedicles were then sutured to the anterior aspect of the inferior orbital rim with absorbable 5-0 Vicryl sutures. This allowed for anterior redraping of the septum over orbital fat and they were both repositioned. Therefore, the fat and the septum were anchored to the periosteum en bloc and the septum was tightened at the same time.

2.5. Step two: orbicularis canthopexy

All the patients had lateral suspension of orbicularis oculi muscle sling. Canthal support was achieved by orbicularis canthopexy (Fig. 1C, E). The preseptal orbicularis muscle was secured to the lateral orbital rim periosteum just above the level of the pupil in the procedure. 5-0 Vicryl suture was used for orbicularis canthopexy.

2.6. Step three: muscle plication

Before redrapage, the lateral bilaminar flap was further dissected to create a sickle-like muscle flap. The sickle-like muscle flap was then sutured to the lateral orbital periosteum at the level of the lateral canthus. The muscles were overlapped in the subcilia and lateral canthal area to strengthen the lower eyelid in case of eyelid malposition (Fig. 1D, F).

Conservative skin excision was carried out. When the patient looked extremely upward in supine, the skin flap was draped back over the incision line and the redundant skin was trimmed. The incision was sutured without tension.

2.7. Postoperative care

The dressings were placed over the lower eyelids after operation and they were removed after 24 hours. The patients were instructed to apply ice compresses to the lower eyelids during the first 24 hours while the head was kept elevated on rest. One or two eyedrops were used 3 to 4 times a day for 1 week. The incision was applied with antibiotic ointment three times per day after removal of the dressings for a week. The sutures were removed within 7 days after operation. For the young patient, the wound healed earlier than the old one, the sutures could be removed 5 to 6 days after operation.

3. RESULTS

A total of 697 (588 female and 109 male) patients underwent transcutaneous lower blepharoplasty with three-step supporting approach between 2006 and 2017. The follow-up period ranged from 6 to 36 months. The mean age of the patients was 44 years old (range, 32–71 y old). Two hundred eight five patients underwent fat excision, and 412 patients received fat repositioning. Overall lower-eyelid contour improvement and lower-eyelid malposition were evaluated. All the patients experienced the central fat management including fat excision or fat repositioning. Six hundred sixteen patients underwent the nasal and the central fats management, 81 patients had management of all the three fat compartments. The tear trough of the patients was eliminated or improved. Only a few patients had mild tear trough, while their preoperative severity of it was moderate or severe type. All the patients had improvement in lid laxity and wrinkles due to orbicularis canthopexy, muscle plication, and conservative skin excision. No significant lid laxity was found after operation. The wrinkles of the lower eyelid decreased in all the patients in both length and number. The results of overall improvement are shown in Table 1. The postoperative eyelid malposition is shown in Table 2. The postoperative eyelid malposition between fat excision and fat repositioning is shown in Table 3. The difference between the two methods was not significant. Among the 10 patients who had poor results, three of them complained about minimal scarring and the rest seven patients cared about the limited hematoma and chemosis. The 12 patients with mild malposition were treated with local massage and obtained a satisfactory result without surgical intervention. The representative cases are shown in Figs. 2 and 3.

4. DISCUSSION

The lower-eyelid bag can be ascribed to laxity of the supporting structures of the skin, the orbicularis oculi muscle, the orbital

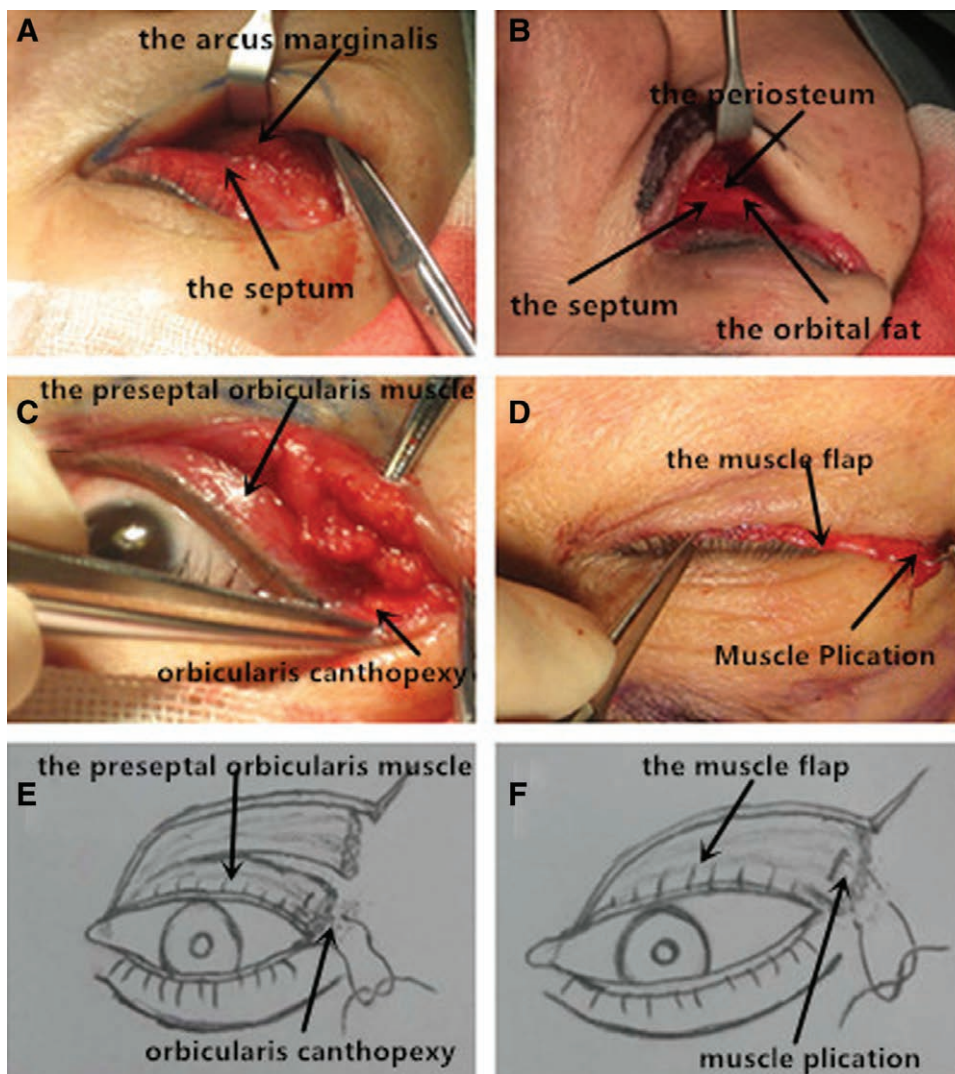


Fig. 1 A, The septum was tightened after excision of fat. B, Repositioning of the fat flap and tightening of the septum. C, Lateral orbicularis canthopexy. D, Plication and anchoring of the muscle flap. E, Drawing of lateral orbicularis canthopexy. F, Drawing of plication and anchoring of the muscle flap.

Results	No. (%) of female patients	No. (%) of male patients	Total, n (%)
Significant improvement	292 (49.7)	50 (45.9)	342 (49.1)
Moderate improvement	206 (35.0)	35 (32.1)	241 (34.6)
Minimal improvement	57 (9.7)	16 (14.7)	73 (10.5)
No improvement	26 (4.4)	5 (4.6)	31 (4.4)
Poor result	7 (1.2)	3 (2.7)	10 (1.4)
Total, n (%)	588 (100)	109 (100)	697 (100)

In 697 patients, 94.2% (n = 656) had improvement, 4.4% (n = 31) had no improvement, only 1.4% (n = 10) had poor result.

septum, the tarsus, and the lateral canthal tendon.⁸ The herniated fat is aggravated by gravitational descent of the midface, comprising the double convexity and the tear trough deformity.^{9,10} Assessment of the cause and expression of the palpebral bags is necessary for optimal selection of surgical procedure.

To date, lower blepharoplasty is one of the most commonly performed cosmetic surgery.¹¹ The rejuvenation of the lower

Position	No. (%) of patients	No. (%) with symptoms	Surgical intervention
Normal	617 (88.5)	0 (0)	N/A
Lateral rounding	46 (6.6)	10 (1.4)	N/A
Scleral show	22 (3.2)	14 (2.0)	N/A
Mild eversion	12 (1.7)	6 (0.9)	N/A
Frank eversion	0 (0)	0 (0)	...
Total, n (%)	697 (100)	30 (4.3)	N/A

Among 697 patients, 95.1% (n =663) had normal position and lateral rounding, 3.2% (n =22) had scleral show, only 1.7% (n =12) had mild eversion, no patient had frank eversion. All the patients who had slight malposition recovered with conservative treatment without surgical intervention. N/A = none application.

eyelid are generally classified into the skin flap transcutaneous procedure, the skin-muscle flap transcutaneous procedure, the transconjunctival procedure, and the Hamra’s procedure.¹² Lower-eyelid malposition can be found in the transcutaneous procedure, and it can be prevented by the prophylactic methods.

Table 3**Comparison of eyelid malposition results between fat excision and fat repositioning**

Position	No. (%) of fat excision	No. (%) of fat repositioning	Total, n (%)
Normal	255 (89.5)	362 (87.9)	617 (88.5)
Lateral rounding	17 (6.0)	29 (7.0)	46 (6.6)
Scleral show	8 (2.8)	14 (3.4)	22 (3.2)
Mild eversion	5 (1.7)	7 (1.7)	12 (1.7)
Frank eversion	0 (0)	0 (0)	0 (0)
Total, n (%)	285(100)	412 (100)	697 (100)

Among 697 patients, 285 patients underwent fat excision and 412 received fat repositioning. There was no significant difference between the two methods in postoperative eyelid malposition.

Lower-eyelid malposition has been cited as the most common complication associated with the transcutaneous lower blepharoplasty. Lower-eyelid malposition has been reported from 5% to 30%, which is too high for patients to accept before consideration of cosmetic lower blepharoplasty.¹³ Techniques have been modified continuously; however, little emphasis has

been placed on lower-eyelid support in the traditional lower blepharoplasty.^{14,15}

In our technique, the three-step support is designed to strengthen the lower eyelid in three different planes to prevent eyelid malposition. The best surgical candidates are the patients who have laxity and wrinkles on their lower eyelids. The snap or distraction test is positive. Canthal tilt exists, and the distance from the lateral canthal to the orbital rim is longer than that of the youth. As to the most of young patients, they are not good candidate for the three-step supporting technique due to lack of symptoms mentioned above. Septum reset produces a significant tightening effect on the lax orbital septum. This procedure has been favorably reported and has not been associated with lower-lid retraction.¹⁶ Like a coin with two sides, everything has two sides. On the one hand, septum reset can lead to retraction of the eyelid due to excessive stretch; on the other hand, it can reinforce the eyelid wall in case of eyelid malposition. This means that appropriate reset of the septum is crucial during anchoring of the septum. The procedure can reduce incidence of lower-lid malposition by strengthening the inner wall of the lower eyelid.

Malposition of the lower eyelid after transcutaneous blepharoplasty is felt to be common without canthal support.

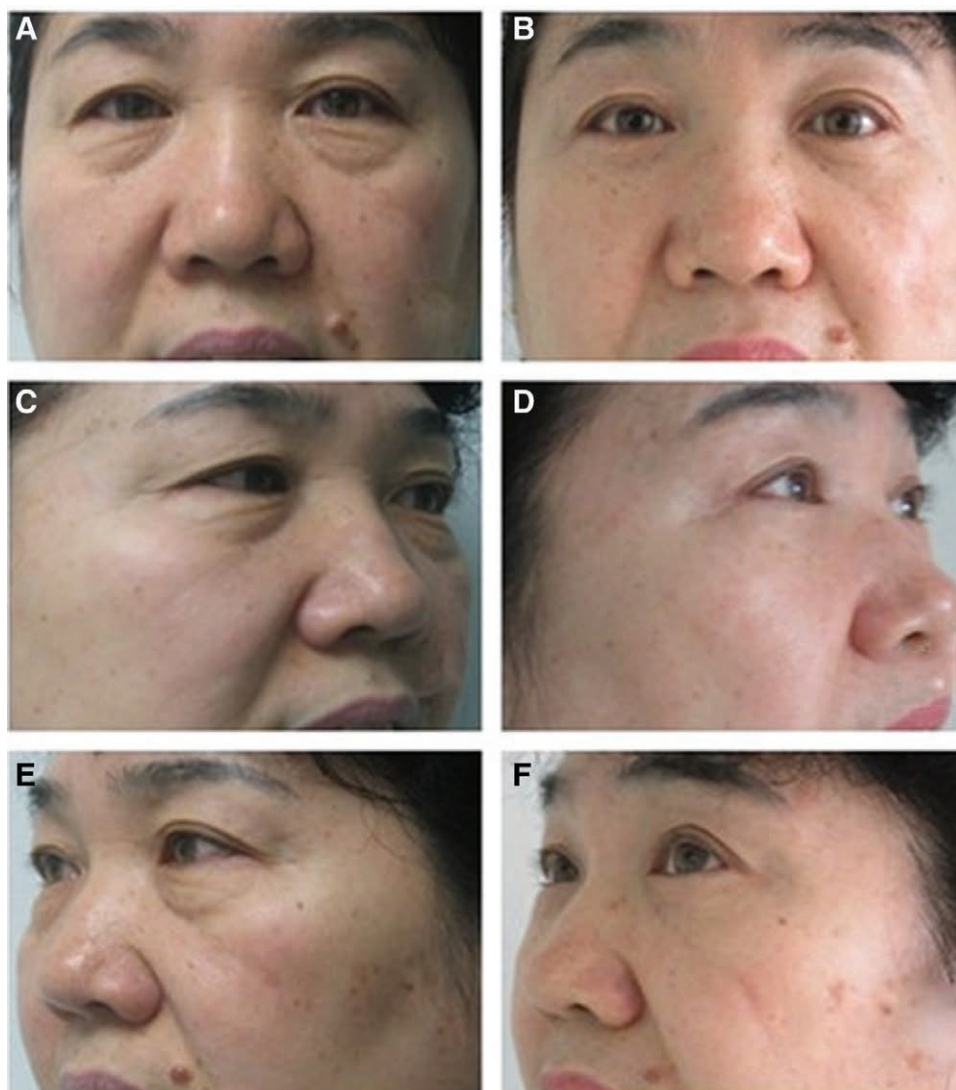


Fig. 2 The representative case of a 47-y-old woman. Preoperative view (A, C, E). Postoperative view after 1 y of operation (B, D, F).

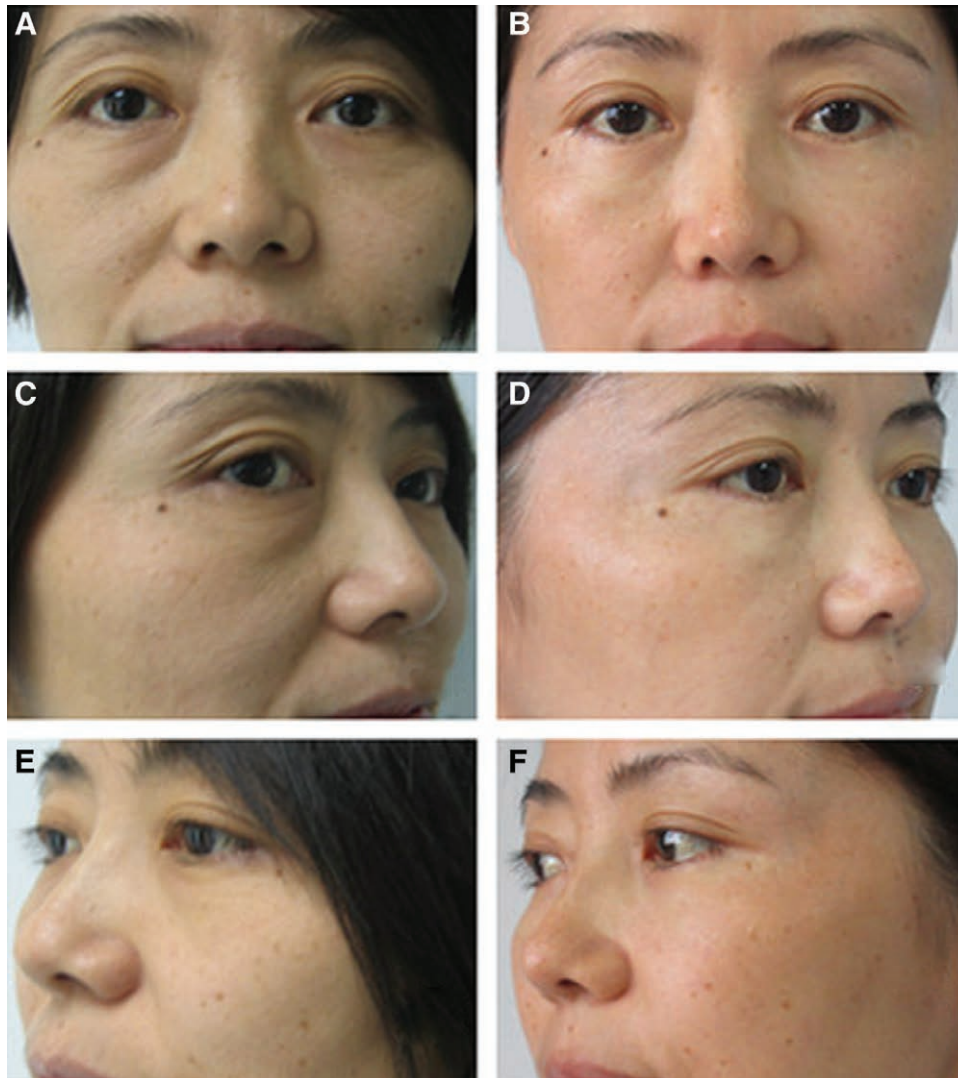


Fig. 3 The representative case of a 41-y-old woman. Preoperative view (A, C, E). Postoperative view after 3 y of operation (B, D, F).

Concomitant canthopexy is carried out in hope for reducing the rate of lower-eyelid malposition.^{17,18} Orbicularis suspension sutures are routinely used for patients with lower-eyelid laxity, otherwise ectropion is possible.¹⁹ In our technique, a “cuff” of pretarsal muscle is maintained and used for orbicularis canthopexy, as a consequence, the strength of the orbicularis oculi muscle is enhanced. The animation of the orbicularis oculi does not change after orbicularis canthopexy.

The plication of the muscle flap can enhance eyelid contour. The plication of the sickle-like muscle flap not only increases fullness of the lower eyelid but also reinforces the lower eyelid. It is true that plication of the flap can prevent ectropion effectively. The sickle-like muscle flap can also help to eliminate the wrinkles on the lower eyelid.

In this study, the surgical technique and results are reviewed in detail: 94.2% of the patients are satisfied with the results; only 4.4% of the patients have no improvement. They may have eye bag in the early stage; therefore, postoperative improvement is not significant; 1.4% of the patients have poor results. Among the patients with poor results, they mainly complain about the minimal scarring. The rate of chemosis is low because the bilaminar flap technique is used. The small-sized hematoma is found and treated by hot compress, and it disappears without surgical

intervention. We do not encounter facial nerve injury because our procedures are carried out under direct vision and our operative maneuvers are away from the zygomatic branch of the facial nerve, which is the nearest branch of the facial nerve. Although some doctors propose that the longer dressing would be better for prevention of hematoma, we usually remove the dressing after 24 hours, so that we can inspect the vitality of the flap and formation of hematoma. If hematoma is found in the early stage, the problem can be solved immediately.

As a matter of fact, the separate step like canthopexy is reported in the previous articles; however, we modify and combine the technique to improve the results. With more than 10-year of experiences, we propose that rejuvenation of the lower eyelid with the three-step supporting approach is acceptable and consistent. The technique can be used for patients with lower-eyelid bag including laxity of the orbicularis oculi muscle, the orbital septum, and the lateral canthal tendon.

There are some limitations in the article. Aesthetic criteria of facial attractiveness in different ethnicities exist and the fundamental structures of the lower eyelid are different.²⁰ Ethnicity is actually associated with different soft tissue quality, such as thicker skin and more obvious scars in the Asian patients; however, our results can provide valuable reference for the Caucasian

patients. Future study is required to compare the effectiveness and complications with other techniques.

In conclusion, three-step supporting technique is safe and effective for lower-eyelid rejuvenation with minimal chance of eyelid malposition.

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